

EXHIBIT C


 northern rock

Run on the United Kingdom's Northern Rock bank, a fallout from the U.S. subprime crisis.

Subprime: Tentacles of a Crisis

Randall Dodd

HOW could a modest increase in seriously delinquent subprime mortgages, which amounted to an additional \$34 billion in troubled loans, so disrupt the \$57 trillion U.S. financial system last summer that worldwide financial turmoil ensued? Lax, if not fraudulent, underwriting practices in subprime mortgage lending largely explain the rise in the rate of seriously delinquent loans from 6 percent to 9 percent between the second quarter of 2006 and the second quarter of 2007. But the impact on financial markets and economies far exceeds any expected losses from mortgage foreclosures.

The answer lies in the evolution of the structure of the home mortgage market. Over the past 70 years, it has changed radically from one in which local depository institutions make loans to one that is centered in the major Wall Street banks and securities firms, which employ the latest in

financial engineering to repackage mortgages into securities through credit derivatives and collateralized debt obligations. Today's mortgage market depends critically on the ability to carve the debt into various risk segments through complex financial instruments and then sell those segments separately—the riskiest segments to high-yield-seeking, and sometimes highly leveraged, buyers such as hedge funds.

To understand how the mortgage market has changed—and to identify where the market broke down, show its structural weaknesses, and explain why the rupture reached across borders to other developed and emerging economies—requires an architectural tour of the U.S. mortgage market.

How the market evolved

Before 1938, the U.S. mortgage market consisted primarily of regulated depository institutions, such as banks and savings and loan

The mortgage market turbulence is as much about the breakdown of the structure of U.S. financial markets as it is about bad debt

associations, that used their deposits to fund home loans. These lenders “originated” the loans and, because they kept them in their portfolios, held the credit risk, the market risk of interest rate fluctuations, and the liquidity risk from funding long-term assets with short-term liabilities (deposits).

To provide greater liquidity and fresh capital to these markets, the government, as part of President Roosevelt’s New Deal policies, created the Federal National Mortgage Association (known as Fannie Mae) in 1938. It was a government-owned

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corporation with the mission of creating a secondary market for mortgages. Fannie Mae bought mortgages from the originators, returning the cash proceeds to the institutions. By buying the mortgages outright and holding them as a portfolio, Fannie Mae acquired the credit risk, market risk, and liquidity risk. But Fannie Mae was in a better position than depository institutions to deal with market and liquidity risks because it could borrow longer term. Fannie Mae was also better able to manage credit (or repayment) risk because it held a mortgage portfolio that was diversified nationwide, which even the largest banks then found difficult to do because of regulatory limits on interstate banking. Fannie Mae would purchase only mortgages that “conformed” to certain underwriting standards. Those lending standards are used today to define “conforming” loans and are synonymous with “prime” mortgages.

Fannie Mae proved to be very successful, and, by the 1960s, the borrowing it did to fund its mortgage purchases constituted a significant share of the debt owed by the U.S. government. To move Fannie Mae’s activities off the federal operating budget, the government-sponsored mortgage market was reorganized during the Johnson administration in 1968. The reorganization created the Government National Mortgage Association (Ginnie Mae) to handle government-guaranteed mortgages through veterans and other federal housing programs. It also privatized the remaining activities into a federally chartered, privately held corporation—officially named Fannie Mae—that retains some public interest obligations for low-income housing. In 1970, Ginnie Mae developed the mortgage-backed security, which shifted the market risk to investors and eliminated from the federal budget much of the debt that had been incurred to fund the government housing programs. The plain mortgage-backed security works by pooling similar mortgages and selling securities that have claims on the mortgage payments from the pool. The payments are passed through directly to the security holders.

The Federal National Mortgage Corporation (known as Freddie Mac) was created in 1970, both to securitize conventional mortgages and to provide competition to the recently privatized Fannie Mae. Over time, the business models of Fannie Mae and Freddie Mac converged, and together they provided an enormous amount of funding for U.S. mortgages, both by purchasing and holding conforming mortgages and by turning a similarly large amount of home loans into mortgage-backed securities.

These securities are purchased by institutional investors, wealthy individuals, and the depository institutions themselves. The securitization process spread the market risk, offered depository institutions a more liquid class of loan assets, and tapped deep sources of capital for the mortgage market.

The mortgage-backed securities market removed market risk not only from the balance sheets of mortgage originators such as banks, but also from those of Fannie Mae and Freddie Mac. It provided long-term funding for mortgage lending and thereby largely eliminated the liquidity risk. Because Fannie Mae and Freddie Mac guaranteed the loans, much of the credit risk stayed with the two mortgage giants, whose size and diversification allowed them to handle it.

Securitization involves the pooling of mortgages into a special-purpose vehicle, which is simply a corporation registered in what is usually an offshore tax haven country. The corporation issues shares that represent claims on the mortgages. The simplest structure is for the pool to pass through the payments on its mortgages to the security holders, whereas more complicated structures divide the payments into higher and lower risk segments.

Securitization allows originators to earn fee income from their underwriting activities without leaving themselves exposed to credit, market, or liquidity risks because they sell the loans they make. If they want, originators can buy back the market risk by purchasing the securities. Investors get more liquid and more diversified mortgage assets, and the mortgage market as a whole obtains greater access to capital. Mortgage servicers earn lucrative fees and interest income. Issuers of mortgage-backed securities earn underwriting fees, and Fannie Mae and Freddie Mac, the government-sponsored enterprises, earn guarantee fees for their securitized issuances.

Private label securities

This market structure, with government-sponsored enterprises at its center, was a tremendous success and attracted competition from other major financial institutions. After the government charged Freddie Mac and Fannie Mae several years ago with serious errors in complying with new accounting rules for derivatives, the major Wall Street firms launched an aggressive move into the issuance of mortgage-backed securities.

In 2003, the government-sponsored enterprises were the source of 76 percent of the mortgage-backed and asset-backed issuances; “private label” issues by major Wall Street firms accounted for the remaining 24 percent, according to *Inside Mortgage Finance*. By mid-2006, the government-

sponsored enterprise share had fallen to 43 percent, with private label issues accounting for 57 percent. Among the large private label issuers were well-known firms—such as Wells Fargo, Lehman Brothers, Bear Stearns, JPMorgan, Goldman Sachs, and Bank of America—as well as several major lenders to high-risk subprime borrowers, such as Indymac, WAMU, and Countrywide.

Along with this radical, and rapid, shift in market shares came a similar change in underwriting standards. Whereas Fannie Mae and Freddie Mac were almost entirely “prime” mortgage lenders, the private label share grew in large part through the origination and securitization of high-risk subprime mortgages as well as “Alt-A” mortgages, which were made to borrowers who were more creditworthy than subprime customers but presented more risks than prime borrowers (see table).

The rise of subprime mortgage origination and securitization created a problem that had not arisen in markets centered on government-sponsored enterprises. How can such low-rated debt securities be sold? The major buyers of prime mortgage-backed securities were institutional investors, but their investment rules and guidelines sharply restricted their exposure to below-investment-grade securities. Small amounts of the \$1.1 trillion in subprime debt, \$685 billion of which was securitized as mortgaged-backed securities, could be sold to various high-yield-seeking investors—but not nearly the entire amount.

Finding new investors

The key to moving subprime mortgage debt through the market was to divide up the risk, creating low-risk investment-grade segments and higher-risk (lower-rated) segments from the pool of mortgages. To do this, Wall Street used the collateralized debt obligation, which was created in 1987 by the now defunct investment firm Drexel Burnham Lambert as part of its junk-bond financing of leveraged buyouts.

The subprime mortgages were pooled into collateralized debt obligations, in which the securitized claims on the pool's payments were carved into various “tranches,” or classes of risk. Like the underlying mortgages, the collateralized debt obligations paid principal and interest. In a simple three-tranche example, the least risky, or senior, tranche has

the first claim on the payments from the pooled mortgages. The senior tranche has the highest credit rating, sometimes as high as AAA, and receives a lower interest rate. After the senior claims are paid, the middle, or mezzanine, tranche receives its payments. Mezzanine represents much greater risk and usually receives below-investment-grade credit ratings and a higher rate of return. The lowest, or equity, tranche receives payments only if the senior and mezzanine tranches are paid in full. The equity tranche suffers the first losses on the pool,

“The key to moving subprime mortgage debt through the market was to divide up the risk.”

is highly risky, and is usually unrated. It also offers the highest rate of return because of the risk. Each class of securities is sold separately and can be traded in secondary markets so that prices can be discovered for each level of risk.

In a collateralized debt obligation, approximately 80 percent of the subprime debt can be resold to institutional investors and others as senior-tranche, investment-grade assets. Hedge funds, the proprietary trading desks of Wall Street firms, and some institutional investors chasing high-yield investments found the lower tranches attractive.

FitchRatings warned in 2005, “Hedge funds have quickly become important sources of capital to the credit market,” but “there are legitimate concerns that these funds may end up inadvertently exacerbating risks.” That is because hedge funds, which invest in largely high-risk ventures, are not transparent entities—their assets, liabilities, and trading activities are not disclosed publicly—and they are sometimes highly leveraged, using derivatives or borrowing large amounts to invest. So other investors and regulators knew little of hedge funds’ activities, while, as FitchRatings put it, because of their leverage, their “impact in the global credit markets is greater than their assets under management would indicate.”

Press reports indicate that typical hedge fund leverage in the purchase of high-yield tranches was 500 percent. That means that \$100 million in capital would be added to \$500 million in borrowed funds for a \$600 million investment in equity or mezzanine tranches of a subprime collateralized debt obligation. If these subordinate tranches were 20 percent of the total debt obligation, and the other 80 percent was sold as investment-grade senior debt to institutional investors, then that \$100 million in hedge fund capital allowed originators and private label mortgage-backed securities issuers to move \$3 billion through the subprime mortgage market—\$2.4 billion as investment-grade securities and \$600 million as high-yield junk.

Markets seize

Unlike publicly traded securities and futures contracts, these collateralized debt obligations and credit derivatives are not traded on exchanges. Instead they trade in over-the-counter

Growing apace

Issuances of below-investment-grade mortgage-backed securities ballooned between 2003 and 2006. (billion dollars; percent of total)

Type	2003	Jan.–June 2006
Prime	57.6 (52)	67.2 (26)
Subprime	37.4 (34)	114.3 (44)
Alt-A	15.8 (14)	76.5 (30)
Total	110.8	258.0

Source: Inside Mortgage Finance.

(OTC) markets. Exchanges act as go-betweens in every sale and trades are public; in OTC markets, trading is bilateral between customers and dealers, and prices and volumes of trades are not disclosed. The price discovery process is not transparent, and there is no surveillance of the market to identify where there are large or vulnerable positions. Moreover, unlike exchanges, these OTC markets have no designated or otherwise institutionalized market makers or dealers to ensure liquidity. As a result, when major events send prices reeling, dealers stop acting as market makers and trading can cease.

When the crunch hit this past August, the markets for subprime mortgage-backed securities became illiquid at the very time that highly leveraged investors such as hedge funds needed to adjust positions or trade out of losing positions (see chart). This left hedge funds locked into damaging positions at the same time they faced margin calls for collateral from their prime brokers. (Hedge funds borrow against the value of their assets, and when those values fall, hedge funds need to come up with fresh capital or sell off assets to repay the loan.) The situation was exacerbated

because, without trading, there were no market prices to serve as benchmarks and no way to determine the value of the various risk tranches.

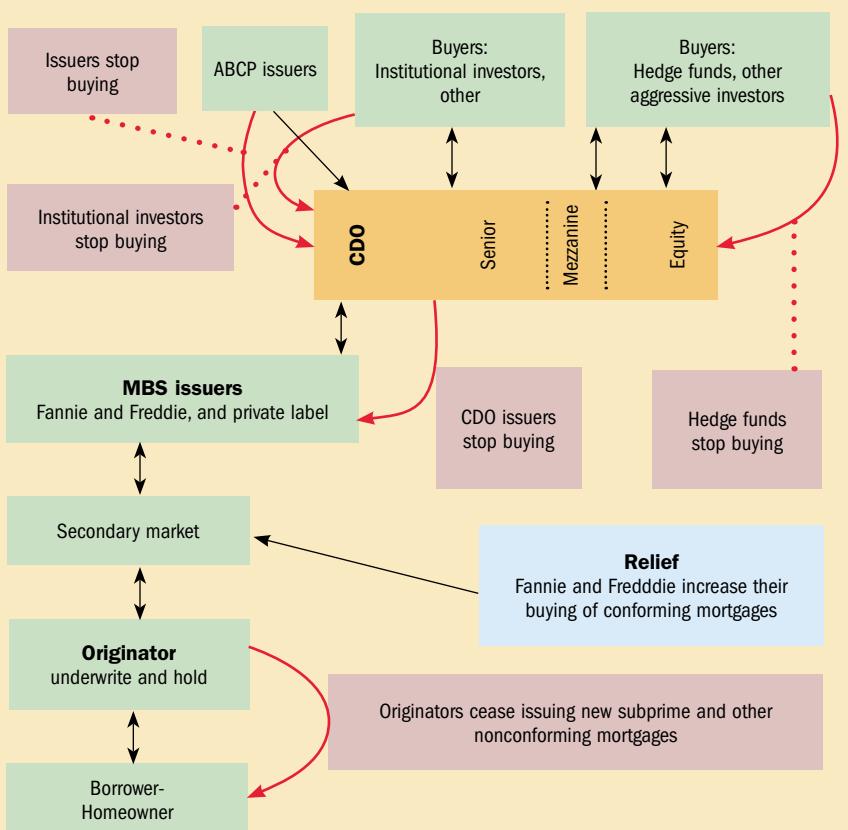
As a result, hedge funds stopped trading, and the collateralized debt obligation market and related credit derivatives markets essentially ceased to exist. Issuers of collateralized debt obligations could not sell their inventory and stopped arranging new issues.

With no buyers in the secondary market, the subprime mortgage originators could not sell the loans they had made. This put enormous pressure on the many originators—a large number of which were thinly capitalized, unregulated finance companies. In turn, the bankers to these originators withdrew their funding, and the originators were unable to carry the inventory of mortgages they had made. They immediately stopped making new loans, at least new subprime loans, and some filed for bankruptcy protection. In turn, prospective home buyers and refinancing homeowners could not obtain nonconforming mortgages, which prevented those with payment problems from refinancing to avoid default. Demand in the housing industry shriveled.

At the same time that hedge funds and other investors stopped buying high-risk tranches of subprime risk, buyers of commercial paper—corporate IOUs that are normally at the top of the creditworthiness pecking order—ceased purchasing asset-backed commercial paper after it came to light that the underlying assets were the investment-grade-rated tranches of subprime mortgages. High credit ratings were once enough to satisfy investors' concerns about credit risk, but the collapse in prices of equity and mezzanine tranches led investors to reassess the investment-grade risk segments. The major banks and broker-dealers that had made guaranteed credit lines to the conduits and structured investment vehicles (SIVs) that were the issuers of this commercial paper had to honor those lines. Banks had used these conduits and SIVs to keep the subprime assets off their books and to avoid related capital requirements. Suddenly, those assets had to be moved back onto the balance sheets of the major

Crunch time

During the recent turbulence, the markets broke down in several areas that were stops in the complicated journey a home mortgage can make from original issuer to ultimate buyer.



Note: ABCP = asset-backed commercial paper; CDO = collateralized debt obligation; MBS = mortgage-backed securities.

banks and Wall Street firms. This required them to obtain additional funding for the conduits and to take a capital charge against the loans to the conduits—adding further to the financial system's demand for credit at a time when that credit was drying up.

Hedge funds and high-yield investors also played a critical role in the cross-border spread of this market rupture. When the prices of the high-risk tranches plummeted and investors could not trade out of their losing positions, then other assets—especially those with large unrealized gains, such as emerging market equities—were sold to meet margin calls or to offset losses. Equity markets fell worldwide, and most emerging market currencies similarly fell in value, although most recovered quickly.

The OTC market's lack of transparency aggravated the problem because investors, suddenly risk averse, did not know who was—and was not—exposed to the subprime risk. The high-yield mortgage securities had attracted many non-U.S. buyers. Several German banks that invested in the U.S. subprime market required regulatory intervention, and depositors made a run on Northern Rock, a bank in the United Kingdom. The seizing up of the asset-backed commercial paper market hit Canada, because the guaranteed credit lines supporting asset-backed commercial paper conduits proved to be badly written, creating legal uncertainty at a critical time. The situation was not resolved until the central bank publicly insisted that banks honor their commitments regardless of the legalities.

Locating the ruptures

Several points of weakness contributed to the market failure that allowed a 3 percentage point jump in serious delinquency rates on a subsection of U.S. mortgages to throw a \$57 trillion U.S. financial system into turmoil and cause shudders across the globe:

- The market first broke down at the juncture where the **highest-risk tranches of subprime debt were placed with highly leveraged investors.** Hedge funds have no capital requirements (they are unregulated in this regard), and the industry practice of highly leveraged investing allowed for excessive risk taking. Taking risks in proportion to invested capital has the prudential benefit of limiting risk taking and providing a buffer between losses and bankruptcy. Taking risks in excess of prudential limits is an unstable foundation for organizing capital markets and a weak point in the market structure.
- The market also ruptured because **unregulated and undercapitalized financial institutions were liquidity providers to the OTC markets** in subprime collateralized debt

obligations and credit derivatives. As soon as those markets' solvency troubles emerged, they became illiquid and trading essentially ceased.

• **Unregulated and undercapitalized mortgage originators** also contributed to the crunch. The originators, like the hedge funds, operated with too little capital and used short-term financing to fund the subprime mortgages they made and expected to hold only briefly. When they could not sell those mortgages to the firms that packaged them into securities, many unregulated originators were forced out of business.

• **Lack of transparency in the OTC markets** exacerbated the situation. The inability of market participants to identify the nature and location of the subprime mortgage risk led to a sudden shift in risk assessment. Once overly optimistic about the risks of the subprime market, scared and confused investors suddenly panicked and overestimated risk, shunning even senior,

investment-grade tranches.

• **OTC markets also suffered from a failure of liquidity.** Instead of showing resilience in the face of greater price volatility, these markets ceased trading as counterparties became untrustworthy and buyers fled.

A start at fixing the markets

Although specific remedies are needed to restore stability to housing finance, the subprime crisis brought to light broader weaknesses. To deal with those weaknesses, several issues need to be considered.

First, the effectiveness of applying industry standards and any existing regulations pertaining to the use of collateral (margin) to OTC derivatives and hedge fund borrowing should be evaluated.

Second, policymakers ought to assess the impact on efficiency and stability of setting reporting requirements for hedge funds and OTC markets, such as those for derivatives and for securities—for example, collateralized debt obligations.

Third, extending measures—such as those in existence at stock exchanges and OTC markets for U.S. treasury securities—that oblige dealers to act as market makers ought to be considered. Otherwise, what can be done to help prevent illiquidity in key OTC markets?

Fourth, the benefits should be explored of placing mortgage originators under a prudential regulatory framework and federal authority that treats these firms like financial institutions, which they are. ■

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